

# The health benefits and uses of soya globally

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Over the last three decades, the health effects and utilisation of soya have been vastly studied. Soya beans are rich sources of high-quality protein, unsaturated fatty acid, fibre and bioactive compounds that are beneficial for different nutritional needs. Likewise, soya plays a critical role in the prevention or treatment of many chronic diseases and is key to addressing food insecurity and malnutrition. Its versatile nature makes it a popular food item and/or ingredient in many products globally.

## Food security and nutrition

The 17 Sustainable Development Goals (SDGs) were implemented in 2015 to address the main global challenges, namely poverty, food insecurity and malnutrition, by 2030. Unfortunately, even before the Covid-19 pandemic, it was clear that the goals to ensure food security for all and to eradicate all forms of malnutrition were not going to be met.

The pandemic had a devastating effect on the global economy. It resulted in high food prices and persistently high levels of poverty and income inequality, which led to 732 million people living in poverty in 2020. Poverty is an underlying cause of food insecurity and in 2020, almost 2,37 billion people did not have access to adequate food, making them food insecure.

Food insecurity is associated with various forms of both under- and overnutrition. Although the full impact of Covid-19 has not been fully assessed, it is estimated that globally 22% of children under five years of age were stunted, 6,7% wasted and 5,7% were overweight in 2020. Not only were children's nutritional

statuses affected, but the prevalence rate of anaemia among women aged 15 to 49 years was estimated at 29,9% globally. On the other hand, adult ( $\geq 18$  years old) obesity is increasing – the global prevalence rate of overweight individuals was 38,9% in 2020.

The main drivers to food security and nutrition are underlying poverty and inequality, conflict, climate change and the economy – specifically economic slowdowns and recessions, and unaffordability of healthy diets. Although these drivers are unique, they are interrelated and can create complex impacts at various points within food systems.

## Nutritious, affordable food for all

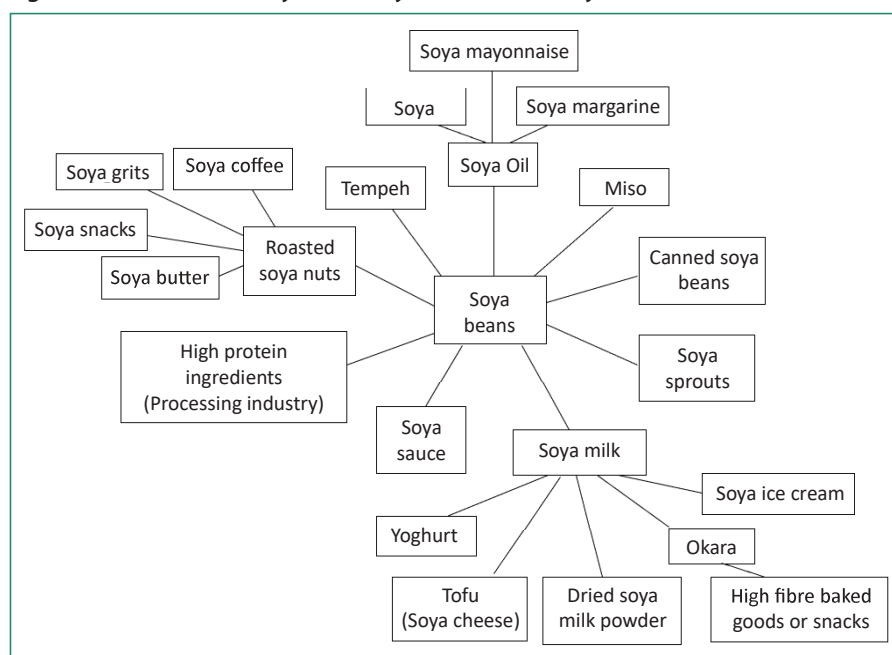
A need to build equitable, resilient and sustainable systems through an equity-

sensitive approach was recognised in 2020. The purpose is to ensure nutritious, accessible and affordable food for all.

Six possible pathways were recommended to transform food systems, and address the major drivers of food insecurity and malnutrition:

- Integrating humanitarian, development and peacebuilding policies in conflict-affected areas.
- Scaling up climate resilience across food systems.
- Strengthening resilience of the most vulnerable to economic adversity.
- Intervening along the food supply chains to lower the cost of nutritious food.
- Tackling poverty and structural inequalities and ensuring interventions are pro-poor and inclusive.

Figure 1: Uses of whole soya beans by the food industry.



**Table 1: Global use of soya ingredients by the food processing industry.**

Ingredient	Processing	Main nutritional value	Uses in the food industry
<b>Soya flour</b>	<ul style="list-style-type: none"> <li>Soya beans are hulled, cracked and heat-treated to form soya bean flakes.</li> <li>Soya bean flakes are ground through a mesh to form soya flour.</li> <li>Full-fat soya or oil can be extracted during processing for low-fat (2/3) soya or defatted flour.</li> </ul>	>50% <65% soya protein, carbohydrates, ash.	<ul style="list-style-type: none"> <li>Used with other flours to improve protein content of baked foods.</li> <li>Improves taste, texture, crust colour (bakery products) and yields of foods.</li> <li>Can be used for partial egg replacement.</li> <li>Bakery products.</li> <li>Crispy soya chips and crackers.</li> <li>Corn soya blend (CSB).</li> <li>Ready-to-use therapeutic foods (RUTFs).</li> <li>Protein bars.</li> <li>Soya peanut butter spread.</li> <li>Pasta and noodles.</li> <li>Breakfast cereals.</li> <li>Ready-to-drink beverages.</li> <li>Tofu.</li> <li>Soya milk.</li> </ul>
<b>Soya protein concentrate</b>	<ul style="list-style-type: none"> <li>More refined than soya flour.</li> <li>Processed from defatted soya bean flakes washed in alcohol, water or acid to remove oligosaccharides and dietary fibre.</li> <li>Can also be prepared using soya flour.</li> <li>Reduced flavour level compared to soya flour.</li> </ul>	>65% <90% soya protein.	<ul style="list-style-type: none"> <li>Special nutrition (e.g. weight loss powders).</li> <li>Baby food and formula.</li> <li>Canned soups and dried soup mixes.</li> <li>Gravy powders.</li> <li>Soya milk, creamers, milk replacers, spray-dried milk powders.</li> <li>Bakery products.</li> <li>Protein supplements.</li> <li>Protein bars.</li> <li>Sports nutrition (shakes, powders).</li> <li>Meat analogues.</li> <li>Breakfast cereals.</li> <li>Ready-to-drink beverages.</li> </ul>
<b>Soya protein isolate (SPI)</b>	<ul style="list-style-type: none"> <li>The most refined form of soya protein.</li> <li>Processed from defatted soya bean flakes or soya flour washed in water or alkali to remove carbohydrates and dietary fibre, leaving mainly a protein-bland flavour.</li> </ul>	≥90% soya protein. High in lysine.	<ul style="list-style-type: none"> <li>Mainly used to improve soya content of food products.</li> <li>Special nutrition (e.g. weight-loss powders).</li> <li>Baby food and formula.</li> <li>RUTFs.</li> <li>Soya milk, creamers, milk replacers, spray-dried milk powders.</li> <li>Dairy-type products (frozen desserts, sour cream, dips).</li> <li>Processed and restructured meat products (as emulsifier).</li> <li>High-protein bars.</li> <li>Breakfast cereals.</li> <li>Ready-to-drink beverages.</li> <li>Sports nutrition (shakes, powders).</li> </ul>
<b>Texturised soya protein (TSP)</b>	<ul style="list-style-type: none"> <li>Isolated from defatted soya bean flakes, soya flour, grits or soya protein concentrates that are extruded, compressed and cut in granular form or chunks.</li> <li>When reconstituted with liquid, the texture resembles minced or cubed beef or poultry.</li> </ul>	≥70% soya protein.	<ul style="list-style-type: none"> <li>Dry unflavoured TSP sold on shelves or as part of flavouring agents.</li> <li>Frozen meat replacements and analogues.</li> <li>Pizza toppings.</li> <li>Tamales.</li> <li>Convenience food that is packaged and ready to eat (frozen dinners and meals, soups, meat pie fillings).</li> <li>Canned meat.</li> </ul>
<b>Soya germ</b>			<ul style="list-style-type: none"> <li>Soya-enriched pasta.</li> </ul>
<b>Soya isoflavones</b>	<ul style="list-style-type: none"> <li>Extracted</li> </ul>	Isoflavones	<ul style="list-style-type: none"> <li>Nutritional supplements.</li> <li>Cereal bars.</li> <li>Fruit juices.</li> <li>Tomato-based soya juice.</li> </ul>
<b>Lecithin</b>	<ul style="list-style-type: none"> <li>A by-product of soya oil processing.</li> <li>Available in powder or liquid form.</li> </ul>		<ul style="list-style-type: none"> <li>Used as an emulsifier.</li> </ul>
<b>Soya albumen</b>	<ul style="list-style-type: none"> <li>Partially hydrolysed proteins that are soluble in water, acids and alkalis, hot syrup and cane can be pasteurised without coagulation.</li> </ul>		<ul style="list-style-type: none"> <li>Aerating agents used with whole eggs or egg whites to improve the whipping rate and stability of mousses and whips.</li> <li>Desserts and confectionaries (nougat, fudge, meringues and meringue powders, creams, ready-to-use cake icing).</li> </ul>

- Strengthening food environments and changing consumer behaviour to promote dietary patterns, with positive impacts on human health and the environment.

Nutritionists can play a role in changing consumer behaviours through awareness and nutrition education programmes (NEPs). In addition, nutritionists, food producers and processors can work together to develop nutritious, yet affordable products for local markets. Interestingly, an in-depth understanding of the health benefits and uses of soya is critical in this regard.

### The importance of soya

Soya has many health benefits, is affordable and versatile to use, and is thus a good food product to address both food insecurity and malnutrition.

#### Health benefits

Soya beans (*Glycine max*) have gained prominence in the food industry as an essential functional food due to their health benefits. Soya is a complete plant protein source, comparable to animal protein, as it provides all the essential amino acids.

Soya also contains a variety of micronutrients such as thiamine, riboflavin, calcium, magnesium, iron, zinc and phytochemicals. Vitamins, minerals, protein and fibre are all-important parts of a healthy diet. In addition, soya beans have beneficial phytochemicals (e.g. isoflavonoids) that have anti-oxidative and anti-inflammatory properties, provide anti-atherogenic effects and assist in reducing systolic blood pressure.

Soya protein consumption has been associated with lowering diastolic blood pressure, reducing total cholesterol, low-density lipoprotein (LDL, the bad cholesterol) and triglyceride levels, as well as increasing high-density lipoprotein (HDL, the good cholesterol). In addition, the weak estrogenic effect of isoflavonoids present in soya, can be beneficial to post-menopausal women because of its potential role in the prevention and treatment of non-communicable diseases such as cardiovascular disease (CVD), osteoporosis and breast cancer.

As a result of these health benefits, the United States Food and Drug Administration (FDA) approved a cholesterol health claim for soya protein which stated that 25g of soya protein per day, as part of a diet low in saturated fat and cholesterol, may reduce the risk of heart disease. Soya products containing at least 6,25g of protein, may carry this health label.

Despite the high nutritional value of soya beans, there have been some concerns about the effect of anti-nutritional factors. These anti-nutritional factors inhibit or reduce the absorption rate of micronutrients. It is thus important to note that simple cooking practices such as soaking overnight, heating (roasting) or fermentation, as well as industrial processing under ultraviolet radiation help to reduce anti-nutritional risks.

Another potential source of concern is the use of soya as food ingredients and the impact of processing on its health benefits. Processing may have undesirable effects, particularly when soya is used to produce foods high in added sugars and saturated fats. It can, however, be safely concluded that the health benefits provided by the rich nutrient content of soya vastly outweigh the nutritional concerns.

#### Affordability

Soya beans produce more kilograms of usable protein per hectare of farmland than all other forms of complete protein (soya protein is 17 times more effective to be produced) and uses less water than other forms of quality or complete proteins. This has the potential of saving over 20 million litres of water for each ton of soya produced.

#### Versatility

New soya products have continued to flood the global markets. In 2018, more than 7 000 novel products containing soya protein were launched globally. This spike has given rise to the prominence of second-generation soya products. These are foods containing soya or soya-based compounds as ingredients.

The increased prominence of second-generation soya products is due to the nutritional value and versatility of soya that resulted in food products



Edamame is also a popular soya-based food item found in many food stores globally. Edamame can be consumed fresh in convenience foods such as salads, as sprouts and as a pasta ingredient. It can be canned, frozen and cooked either in shelled or unshelled form. It is also served as a roasted snack.

highly acceptable to consumers. This is especially true for those who rely on plant-based protein sources or consume plant-based diets.

Soya protein has also gained prominence among food processors due to its gel-forming, emulsifying, flavour-binding, water- and fat-absorbing properties when used in baked goods, meat and sausages.

Figure 1 shows the variety of food products processed from whole soya beans globally, and Table 1 the soya ingredients extracted from whole soya beans and used by the food industry.

#### Conclusion

Overall, soya is highly nutritious and can be effectively processed, manipulated and utilised as food and/or ingredient to produce many other products that are beneficial to human health. This is critical in the global fight against food insecurity and malnutrition.

Soya is also affordable and versatile, and will continue to increase in importance as consumers become more informed about nutrition and food processors become more innovative to meet the ever-changing demands in the food marketplace. 🌱

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